

What is claimed is:

1. A helicopter bucket comprising:

5 a fluid holding vessel, having a bottom, suspended from the helicopter; and

10 a submersible high volume, low head axial flow pump mounted adjacent the bottom of the holding vessel for drawing fluid from a fluid source and delivering the fluid into the holding vessel, the axial flow pump extends along a central axis between an open upper end and an opposite open lower end serving as an inlet for the axial flow pump.

15 2. The helicopter bucket of claim 1 further comprising a means for releasing fluid from the vessel.

3. The helicopter bucket of claim 2 wherein the means for releasing fluid from the vessel comprises a valve.

20 4. The helicopter bucket of claim 3 wherein the valve comprises an inner assembly, the inner assembly comprising a base plate spaced apart from a top plate, the base plate and the top plate defining therebetween an open side portion of the inner assembly, the base plate defining an outlet; and, an outer assembly comprising solid side walls, the outer assembly being movable with respect to the inner assembly between an open position and a closed position, an upper portion of the solid side walls being adapted to sealably cooperate with the top plate only when the outer assembly is in the closed position, a lower portion of the solid side walls being adapted to sealably cooperate with the base plate only when the outer assembly is in the closed position, wherein in the open position flow through the valve is permitted through the open side portion and the outlet of the outer assembly, and in the closed position flow through the valve is prevented by sealing engagement between the solid side walls of the outer assembly and the top plate and by

engagement between the solid side walls and the base plate of the inner assembly.

5. The helicopter bucket of claim 1 wherein the axial flow pump is
powered by a power source.

6. The helicopter bucket of claim 5 wherein the power source is the
helicopter's electrical system.

10 7. The helicopter bucket of claim 5 wherein the power source is the
helicopter's hydraulic system.

8. The helicopter bucket of claim 5 wherein the power source is a battery.

15 9. The helicopter bucket of claim 1 wherein the axial flow pump is
mounted inside of the bottom of the holding vessel.

10. The helicopter bucket of claim 3 wherein the axial flow pump is
mounted inside of the valve.

20 11. The helicopter bucket of claim 1 wherein the axial flow pump is
mounted outside of the bottom of the holding vessel.

12. The helicopter bucket of claim 1 wherein the axial flow pump is
moveable to a lowered position below the bottom of the holding vessel.

25 13. The helicopter bucket of claim 12 further comprising a hose attached to
the upper end of the axial flow pump and the inside of the holding vessel, the
hose being of sufficient length so that fluid may be delivered into the holding
vessel when the axial flow pump is in the lowered position.

30 14. The helicopter bucket of claim 1 wherein the axial flow pump
comprises:

a pump motor mounted adjacent the lower end of the axial flow pump;

5 a water proof power cable connected to the pump motor and a power source;

an output drive shaft extending from the motor along the central axis;

10 an impeller mounted on the drive shaft for driven rotation therewith;

15 a motor to pump adapter to provide a mount for the pump, to center the output drive shaft with the impeller and provide protection against water ingress along the output shaft;

20 a recuperator for directing the flow of water through the axial flow pump, allowing the pump motor to pump at high volumes with lower power;

25 a filter screen mounted adjacent the lower end of the axial flow pump to filter fluid as the fluid is drawn into the axial flow pump;

30 an exit duct mounted adjacent the recuperator to allow fluid to exit from the recuperator; and

 a flap valve mounted adjacent upper end of the exit duct to ensure that the fluid flows through the axial flow pump in a unidirectional manner.

15. The helicopter bucket of claim 14, wherein the power cable is of sufficient length so that power may be delivered to the pump motor when the axial flow pump is in a lowered position.

30 16. The helicopter bucket of claim 1 further comprising a protective guard attached adjacent the lower end of the axial pump to protect the axial pump from damage during operation.

17. The helicopter bucket of claim 1 further comprising a load cell in communication with the axial flow pump for signaling the axial flow pump to automatically stop drawing fluid into the holding vessel when a predetermined amount of fluid has been drawn into the holding vessel.

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18. The helicopter bucket of claim 1 further comprising a load cell in communication with the helicopter for providing an operator of the helicopter a representation of an amount of fluid drawn into the holding vessel.

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19. The helicopter bucket of claim 1 further comprising a level switch in communication with the axial flow pump for signaling the axial flow pump to automatically stop drawing fluid into the holding vessel when a predetermined amount of fluid has been drawn into the holding vessel.

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20. The helicopter bucket of claim 1 further comprising a level switch in communication with the helicopter for providing an operator of the helicopter a representation of an amount of fluid drawn into the holding vessel.

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21. A method for filling a helicopter bucket comprising:

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suspending a fluid holding vessel, having a bottom, from the helicopter; and

drawing fluid from a fluid source by using a submersible high volume, low head axial flow pump located adjacent the bottom of the holding vessel and delivering the fluid into the holding vessel.

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22. The method of claim 21 further comprising using power from the helicopter's electrical system to power the submersible high volume, low head axial flow pump.

23. The method of claim 21 further comprising using power from the helicopter's hydraulic system to power the submersible high volume, low head axial flow pump.

5 24. The method of claim 21 further comprising using power from a battery to power the submersible high volume, low head axial flow pump.

10 25. The method of claim 21 wherein the fluid is drawn from inside of the bottom of the holding vessel.

15 26. The method of claim 21 wherein the fluid is drawn from outside of the bottom of the holding vessel.

20 27. The method of claim 21 wherein the fluid is drawn from a lowered position below the bottom of the holding vessel.

25 28. The method of claim 27 further comprising delivering fluid to the holding vessel while drawing fluid from the lowered position.

30. The method of claim 21 further comprising protecting the holding vessel against damage adjacent to where the fluid is being drawn.

31. The method of claim 21 further comprising automatically stopping the drawing of fluid into the holding vessel when a predetermined amount of fluid has been drawn into the holding vessel.

32. The method of claim 21 further comprising providing an operator of the helicopter a representation of an amount of fluid drawn into the holding vessel.